

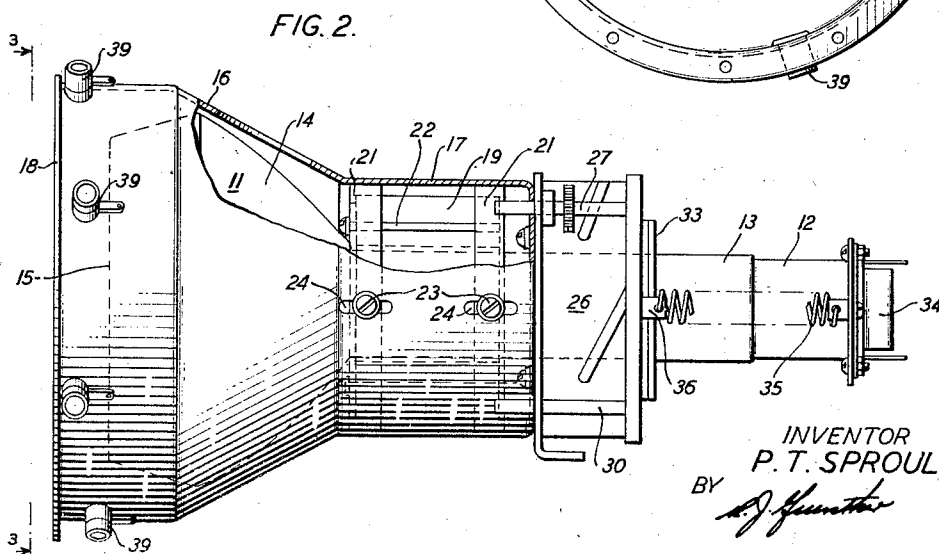
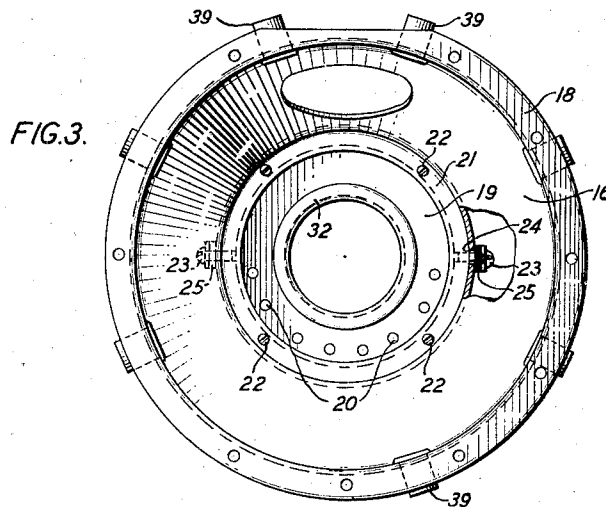
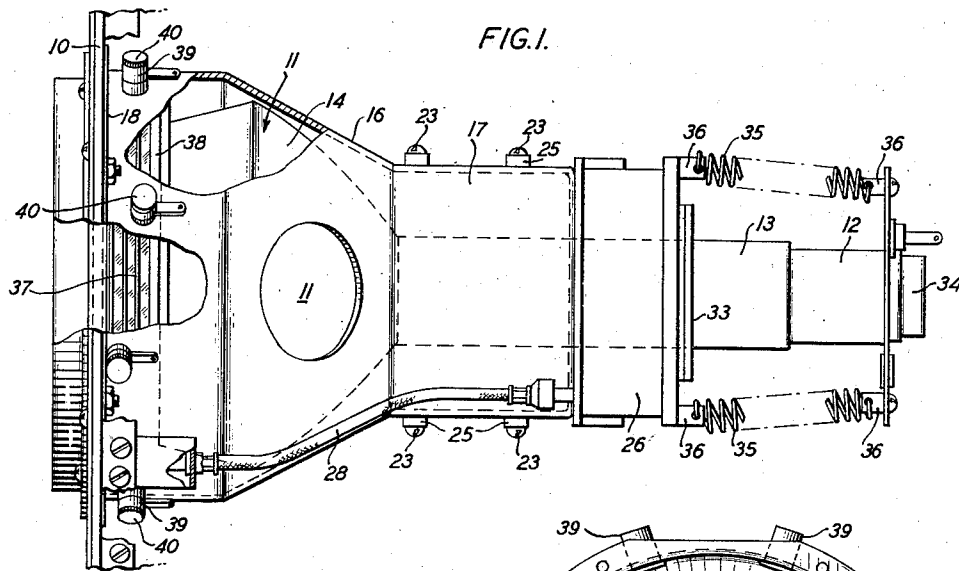
Feb. 10, 1948.

P. T. SPROUL

2,435,613

MOUNTING FOR ELECTRONIC DEVICES

Original Filed Feb. 18, 1944



INVENTOR
P. T. SPROUL
BY *J. J. Hunter*

ATTORNEY

UNITED STATES PATENT OFFICE

2,435,613

MOUNTING FOR ELECTRONIC DEVICES

Philip T. Sproul, Chatham, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Original application February 18, 1944, Serial No. 522,907. Divided and this application October 11, 1946, Serial No. 702,814

12 Claims. (Cl. 250-141)

1

This invention relates to a mounting for electronic beam devices and more particularly to such a mounting for cathode ray devices.

This application is a division of my application Serial No. 522,907, filed February 18, 1944.

An object of the invention is to facilitate the mounting of a cathode ray tube or device from the panel of an enclosure casing in relation to a viewing opening therein.

Another object of the invention is to provide a mounting having shielding and cushioning attributes to protect the device from extraneous disturbances.

A further object of the invention is to support the magnetic components of the mounting assembly in coaxial relation to the tube.

Another object of the invention is to selectively control the relationship of the deflection system and the beam path.

A still further object of the invention is to provide a unitary mounting for the tube whereby all the auxiliary components of the tube cooperate with and are supported by the shell casing.

These objects and other advantages are attained in accordance with this invention by partially enclosing the cathode ray tube in a shell casing having a contour which substantially simulates the shape of the tube wherein the larger diameter portion having the fluorescent screen on the end thereof is situated in a funnel-shaped metallic shell and a portion of the neck of the tube is surrounded by a cylindrical cup portion supporting the magnetic elements for deflecting, focussing and centering the electron beam within the tube. A socket is supported resiliently on the casing assembly and engages the terminal base of the tube. The open end of the casing adjacent the screen of the tube is secured to a panel support to affix the casing, tube, magnetic elements and socket within a cabinet enclosure so that the tube is suspended in the shell casing and the casing projects horizontally to the rear of the panel.

The open end of the shell casing is enclosed by a multirange cover member or scale of transparent material and the casing is provided with a series of lamps around the periphery to cooperate with the edges of the scale to facilitate illumination of the different survey ranges inscribed on the scale.

A feature of this construction is the utilization of the shell or shield as the supporting base for the auxiliary components associated with the cathode ray tube so that axial symmetry of the controlling elements and vibrationless support of

2

the tube may be realized. This is accomplished by mounting the focussing and centering controls of the beam on the rear of the shield casing in close proximity to the beam projection gun of the cathode ray tube and mounting the deflection coil within the neck portion of the casing in an advanced position to influence the beam in its path toward the screen of the tube.

Another feature relates to the adjustability of the deflection coil in the casing in order to orient the magnetic fields with respect to the beam of electrons being projected along the axis of the tube. This involves the location of an annular deflection coil in the cup portion of the shield and adjustably controlling the position of the coil with respect to the rotational and horizontal relation to the beam in the tube so that the coil is coaxially symmetrical with the axis of the tube.

A further feature relates to the cushion mounting of the tube in the shell to materially reduce shock and vibration effects imposed on the mounting during transit and operation under adverse conditions. The tube is suspended in the shell casing by distributed cushioning means associated with the deflection coil, cover member, focussing magnet and a terminating spring mounted socket so that the cathode ray tube is completely cradled in a series of shock-absorbing elements which dissipate extraneous disturbances that might deleteriously affect the uniform operating characteristics of the cathode ray tube.

These and other features and advantages of the invention will be more clearly set forth in the following detailed description which, together with the accompanying drawings, comprise the disclosure of this invention.

Fig. 1 is a side elevational view of the mounting assembly of this invention with portions of the casing broken away to show details of construction;

Fig. 2 is a top view of the assembly as shown in Fig. 1 except that the panel and scope are removed and a portion of the casing is cut away to show certain internal elements; and

Fig. 3 is an end view of the casing taken on the line 3-3 of Fig. 2 with the tube removed from the casing.

The mounting in one aspect of this invention is adapted primarily for a cathode ray tube employed in radio finder systems at a stationary point or in a moving vehicle, such as a ship or aircraft, to search and track a target over large expanses of land or sea and over a large elevation range to indicate the presence of hostile forces.

As shown in Fig. 1, the cathode ray tube mount-

ing is attached to a panel 10 extending in front of radio receiver equipment including a cathode ray device or tube 11 having a terminal base portion 12 and an elongated neck portion 13 connected to a conical portion 14 which terminates in a flat end portion 15 having a fluorescent coating on the inner surface, which serves as a screen of the device. The neck portion encloses an electron gun, not shown, which projects an electron beam towards the screen on the end portion 15, to excite the fluorescent coating and the beam may be focussed to a sharp spot on the screen and variably deflected over the whole surface of the screen to indicate the location of the spot with respect to the axis of the tube.

In order to mount the tube 11 in suitable relation to a panel opening so that the screen may be viewed efficiently, the tube is supported on the rear of the panel 10 by a metallic shell casing or shield having an open truncated conical portion 16 enclosing the screen and portion 14 of the device and a cup-shaped portion 17 having an apertured end surrounding the neck portion 13 adjacent the portion 14. The casing is affixed to the panel by screws and nuts extending through a flange portion 18 projecting from the large diameter end of the casing and the tube 11 is coaxially mounted within the casing and extends horizontally from the rear of the panel 10.

An annular electromagnetic coil 19, shown in Figs. 2 and 3, is fitted into the cup portion 17 of the casing and surrounds the neck portion 13 of the tube to deflect the beam projected toward the screen of the device, the coil being provided with suitable terminals 20 on the forward end, to apply various deflection voltages to the windings of the coil. The coil is also provided with metallic end collars 21 which clamp the coil therebetween by bolts 22. The coil is held within the casing by lock screws 23 extending through elongated slots 24 in the cup portion 17, the lock screws being insulated from the casing by bushings 25 and the inner ends of the screws being threaded into the collars 21 to rigidly position the coil in the casing. The deflection coil 19 may be adjustably controlled in rotational and horizontal relation to the device to position the coil in coaxial symmetry with the axis of the tube. When it is desired to adjust the coil longitudinally with respect to the neck portion of the tube 11, the lock screws are released from the collars so that the coil may be moved along the neck of the tube to secure the proper relation of the coil to the beam projected through the tube. The lock screws are then tightened to maintain the position of the coil in the casing. If it is desired to rotate the coil with respect to the tube axis, the bolts 22 in the end collars are released whereby the coil may be turned to the proper position and the bolts are then tightened to clamp the coil between the collars.

In addition to the magnetic deflection of the beam of the tube, an annular adjustable focussing and centering permanent magnet structure 26 is mounted around the neck portion 13 of the tube and is supported on the apertured external end of the cup portion 17 of the casing by screws. This structure is provided with a rotatable shaft 27 to control a shunt ring, not shown, to vary the magnetic field of the focussing magnet. A suitable flexible cable 28 connects this shaft to the panel, for example by suitable adjusting mechanism, not shown, to focus the spot appear-

ing on the screen of the tube. The centering of the beam along the axis of the tube is controlled by a pair of rotatable shafts associated with the permanent magnet structure, one of which is shown at 30 in Fig. 2, and these shafts are coupled to flexible cables, not shown, which extend to the vertical and horizontal adjustments on the panel 10.

Since the beam is susceptible to extraneous vibration which might cause erroneous indication of the spot on the screen, the tube 11 is resiliently supported in the casing to eliminate vibration and shock being transmitted to the tube. This is accomplished by a cushion ring 32, shown in Fig. 3, preferably of soft rubber, which engages the inner periphery of the coil 19 at the forward end and the neck portion of the tube and forms a conical seat for the portion 14 of the tube. The neck portion of the tube is also centrally cushioned in the mounting by an elastic rubber ring 33 on the permanent magnet structure 26 so that the tube is physically separated from the rigidly mounted casing by shock-absorbing material which inhibits vibration disturbances affecting the movement of the beam within the long path in the tube. The adjustable focussing and centering magnet structure 26 is more fully disclosed and claimed in U. S. Patent 2,418,487, issued April 8, 1947.

The base portion of the cathode ray tube is further supported from the casing by a socket 34 which engages the terminals on the base 12 to facilitate circuit connections of the electrodes in the device to associate apparatus mounted behind the panel. The socket is resiliently attached to the magnet structure 26 by tension springs 35 secured to projection studs 36 on the socket and the magnet. This arrangement forms an efficient mounting assembly of the cathode ray tube and the cooperating magnetic components which embrace the tube and facilitates the location of the screen of the tube in suitable relation to an opening in the panel whereby the spot indication on the screen may be readily viewed and utilized in coordination with a transparent scope 37 mounted in telescopic relation in the large open end of the casing adjacent the opening in the panel.

The cover member or scope, which may be of the multilayer type, is also provided with a rubber cushion ring 38 to cradle the screen end of the tube 11 in the mounting and the shell casing is provided with a series of miniature sockets 39 mounted in staggered relation around the periphery of the shell to receive miniature button lamps 40 to selectively illuminate various sections of the scope.

The multiple indicator scope 37 is described and claimed in my application Serial No. 522,907, filed February 18, 1944 and reference thereto is made for the detailed assembly and functional cooperation of the scope with the cathode ray tube 11 contained in the mounting of this invention.

While the above description has been confined to a specific construction of the unitary cathode ray tube mounting, it is, of course, understood that various modifications may be made in the assembly as herein described without departing from the scope and spirit of the invention as defined in the appended claims.

What is claimed:

1. A cathode ray device mounting comprising a metallic shell casing having an open portion of large area surrounding the large diameter

5

portion of said device and an apertured cup portion surrounding the neck of said device, an annular magnetic coil surrounding said neck and adjustably mounted within said cup portion, an adjustable permanent magnet surrounding said neck and supported on the rear of said cup portion, a socket resiliently mounted on said magnet and attached to the terminal end of said device, and yieldable members supported by said coil and magnet cushioning said device in the mounting.

2. A cathode ray device mounting comprising a metallic shell casing having an open portion of large area surrounding the large diameter portion of said device and an apertured cup portion surrounding the neck of said device, an annular magnetic coil surrounding said neck and mounted within said cup portion, means for adjusting said coil longitudinally within said casing, means for rotationally adjusting said coil with respect to said device, an adjustably permanent magnet supported on the apertured end of said cup portion, a socket resiliently mounted on said magnet and attached to the terminal end of said device, and rubber cushion rings on the extremities of said coil and magnet engaging the neck of said device.

3. A cathode ray device mounting comprising a metallic shell casing having an open portion of large area surrounding the large diameter portion of said device and an apertured cup portion surrounding the neck of said device, an annular magnetic deflection coil surrounding said neck and adjustably mounted within said cup portion, a focussing magnet surrounding said neck and supported on the rear of said cup portion, a socket resiliently mounted on said magnet and attached to the terminal end of said device, yieldable members supported by said coil and magnet cushioning said device in the mounting, and a transparent cover member extending across the open end of said shell casing.

4. A cathode ray device mounting comprising a metallic shell casing having an open portion of large area surrounding the large diameter portion of said device and an apertured cup portion surrounding the neck of said device, an annular magnetic coil surrounding said neck and adjustably mounted within said cup portion, an adjustable permanent magnet surrounding said neck and supported on the rear of said cup portion, a socket resiliently mounted on said magnet and attached to the terminal end of said device, yieldable members supported by said coil and magnet cushioning said device in the mounting, and a multiscale transparent member covering the open end of said shell casing.

5. A cathode ray device mounting comprising a metallic shell casing having an open portion of large area surrounding the fluorescent screen of said device and an apertured cup portion surrounding the neck of said device, a magnetic coil surrounding said neck and adjustably mounted within said cup portion, an adjustable permanent magnet surrounding said neck and supported on the rear of said cup portion, a socket resiliently mounted on said magnet and attached to the terminal end of said device, and a multilayer luminescent scope disposed before the screen of said device in the open end of said casing.

6. A cathode ray device mounting comprising a metallic shell casing having an open portion of large area surrounding the large diameter portion of said device and an apertured cup portion surrounding the neck of said device, a magnetic

6

coil surrounding said neck and adjustably mounted within said cup portion, an adjustable permanent magnet surrounding said neck and supported on the rear of said cup portion, a socket resiliently mounted on said magnet and attached to the terminal end of said device, a multilayer luminescent scope disposed before said device in the open end of said casing, and a plurality of radially directed lamps mounted in relation to the layers in said scope and supported by said casing.

7. A cathode ray device mounting comprising a metallic shell casing having an open portion of large area surrounding the large diameter portion of said device and an apertured cup portion surrounding the neck of said device, an annular magnetic coil surrounding said neck and adjustably mounted within said cup portion, an adjustable permanent magnet surrounding said neck and supported on the rear of said cup portion, a socket adapted to receive the terminal base on the neck end of said device, and tension spring supports extending between said socket and said permanent magnet.

8. A cathode ray tube mounting comprising an apertured panel, a metallic shell casing extending horizontally from said panel, said casing having a tapered portion surrounding the large diameter portion of said tube and an apertured cup portion surrounding the neck of said tube, a magnetic coil within said cup portion, a focussing magnet coaxially mounted on the rear of said cup portion, a socket for accommodating the terminal end of said tube, tension springs supporting said socket on said magnet, and distributed cushion rings on said coil and magnet embracing said tube.

9. A cathode ray tube mounting comprising an apertured panel, a metallic shell casing extending horizontally from said panel, said casing having a tapered portion surrounding the large diameter portion of said tube, and an apertured cup portion surrounding the neck of said tube, a magnetic coil within said cup portion, a focussing magnet coaxially mounted on said cup portion and surrounding said neck portion, a socket for accommodating the terminal end of said tube, tension springs supporting said socket on said magnet, a transparent cover plate disposed in the end of said shell adjacent said panel, and a series of cushion members on said cover plate, coil and magnet engaging adjacent portions of said tube.

10. A cathode ray tube mounting comprising an apertured panel, a metallic shell casing extending horizontally from said panel, said casing having a tapered portion surrounding the large diameter portion of said tube and an apertured cup portion surrounding the neck of said tube, a magnetic coil within said cup portion, a focussing magnet on said cup portion and surrounding said neck portion, a resiliently supported socket engaging the terminal end of said tube, a transparent cover plate disposed in the end of said shell adjacent said panel, and a series of cushion rings on said cover plate, coil and magnet engaging adjacent portions of said tube, said rings having decreasing diameters to conform to the different diameters of the tube as it extends away from said panel.

11. In a cathode ray tube mounting, a metallic shell casing having a large diameter portion surrounding the tapered portion of said tube, and a cup portion surrounding the neck of said tube, said cup portion having spaced slots on opposite sides thereof, an annular coil within said cup

7

portion coaxial with the axis of said tube and casing, and adjustable locking means extending through said slots to fix the position of said coil in relation to said tube.

12. In a cathode ray tube mounting, a panel, a metallic shell casing having a large diameter portion surrounding the tapered portion of said tube and an apertured cup portion surrounding

8

the neck of said tube, an adjustable focussing permanent magnet surrounding the neck of said tube and affixed coaxially and externally to said apertured cup portion, an adjustable centering magnet associated with said focussing magnet, and control means extending from said panel to said focussing and centering magnets.

PHILIP T. SPROUL.